



# Key Facts About the Mathematics and Computer Science Division

## Range of Research

Researchers in the Mathematics and Computer Science Division attack complex problems in four key scientific areas important to our nation:

- **Extreme Computing:** developing new system and run-time technologies for future extreme-scale computers that handle the massive scale, increased failure rate and power management needs of these systems.
- **Data-Intensive Science:** formulating novel techniques for managing, storing, and visualizing the enormous amounts of data produced by leadership-class computers and large experimental facilities.
- **Applied Mathematics:** developing new algorithms and libraries for exploiting high-performance computing in targeted applications.
- **Science & Engineering Applications:** working with scientists and engineers to apply our advanced algorithms and software tools to challenging problems of national interest.

## Award-Winning Software

**MPICH:** providing a high-performance, widely portable implementation of the Message Passing Interface standard.

**Globus Online:** enabling large quantities of information to be moved reliably, efficiently, and securely worldwide.

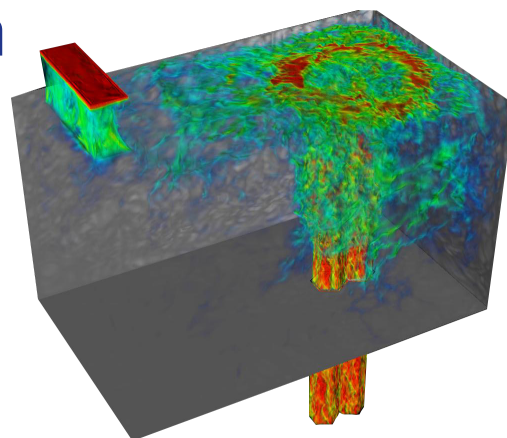
**Globus Toolkit:** enable the secure, scalable, and coordinated use of resources in dynamic, multi-institutional “virtual organizations.”

**PETSc:** providing a suite of codes for solving large-scale problems modeled by partial differential equations.

## Exciting New Initiatives

With the aim of enabling breakthroughs in science and engineering, we collaborate with the scientific community on solving problems critical to the national interest, including the following:

- **CIM-EARTH**, studying socioeconomic implications of climate change and energy policy.
- **Earth Microbiome Project**, characterizing global microbial taxonomic and functional diversity.



- **Computation-Driven Discovery for the Dark Universe**, seeking to shed light on dark matter and dark energy.
- **Urban Sciences Center for Computation and Data**, applying advanced computational techniques to the design of smarter cities.
- **Center for Exascale Simulation of Advanced Reactors**, developing innovative nuclear reactor analysis tools.
- **Multifaceted Mathematics Center for Complex Energy Systems (M<sup>2</sup>ACS)**, tackling the long-term mathematical challenges arising in complex electrical energy systems.

## Signature Software

MPICH	Swift
Nek5000	TAO
PETSc	Model Coupling Toolkit
ADIC	ROMIO
PVFS	MG-RAST
Globus Toolkit	ADLB
MINOTAUR	ZeptoOS

**Director:** Marc Snir  
**Deputy Division Director:** Rajeev Thakur  
**Regular Staff:** 86  
**Postdocs:** 19  
**Students:** 55  
**Joint Appointments / Visitors:** 41  
**URL:** [www.mcs.anl.gov](http://www.mcs.anl.gov)



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